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Univalent conformal mappings onto polygonal domains with countable set of vertices by generalized Christoffel–Schwarz integral

Khasanova E.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2017, Allerton Press, Inc.We propose a formula for the conformalmapping of the upper half-plane onto a polygonal domain, which generalizes the Schwarz–Christoffel equation. It is obtained by terms of partial solution to the Hilbert boundary-value problem with a countable set of singularity points of the coefficients including a turbulence of logarithmic type at the infinity point. We also prove the existence of closed and univalent mappings.

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Keywords

conformal mapping, Hilbert boundary-value problem, Schwarz–Christoffel equation, univalent function

References

[1] Aleksandrov, I. A. “Conformal Mappings of a Half-Plane Onto Domains With Transfer Symmetry”, Russian Mathematics 43, No. 6, 13–16 (1999).

[2] Kolesnikov, I. A., Kopaneva, L. S. “ConformalMapping Onto Numerable Polygon With Double Symmetry”, Russian Mathematics 58, No. 12, 32–40 (2014).

[3] Riera, G., Carrasco, H., Preiss, R. “The Schwarz–Christoffel Conformal Mapping for ‘polygons’ With InfinitelyMany Sides”, Internat. J.Math. Math. Sci. 1–20 (2008), Art. ID 350326.

[4] Floryan, J.M., Zemach, C. “Schwarz–Cristoffel Methods for ConformalMapping of RegionsWith a Periodic Boundary”, J. Comput. Appl.Math. 46, No. 1–2, 77–102 (1993).

[5] Salimov, R. B., Shabalin, P. L. “Mapping of a Half-Plane Onto a Polygon With Infinitely Many Vertices”, Russian Mathematics 53, No. 10, 68–71 (2009).

[6] Salimov, R. B., Shabalin, P. L. “M. A. Lavrent’ev Inverse Problem for Mapping of Half-Plane on Polygon in the Case of Infinite Number of Vertices”, Izv. Saratov Univ. New Series. Ser. Matem., Mekhan., Inform. 10, No. 1, 23–31 (2010) [in Russian].

[7] Salimov, R. B., Shabalin, P. L. “A Generalization of the Schwarz–Christoffel Formula”, Sib. Zh. Ind. Mat. 13, No. 4, 109–117 (2010) [in Russian].

[8] Karabasheva, E. N., Shabalin, P. L. “Univalence of Mappings From Half-Plane to a Polygonal Domains With Infinite Sets of Vertices”, Lobachevskii J. Math. 36, No. 2, 144–153 (2015).

[9] Salimov, R. B., Shabalin, P. L. “Homogeneous Hilbert Boundary-Value Problem With Countable Set of Discontinuities and Logarithmic Singularity of Index”, RussianMathematics 57, No. 12, 75–79 (2013).

[10] Jurov, P. G. “Asymptotic Estimates of Integral Functions Defined by Canonical Products”, Math. Notes 10, 816–820 (1972).

[11] Mel’nik, I. M. “Ein außergewöhnlicher Fall des Riemannschen Randwertproblems”, Tr. Tbilis. Mat. Inst. Razmadze 24, 149–162 (1957) [in Russian].

[12] Aksent’ev, L. A., Shabalin, P. L. “Sufficient Conditions for Univalence and Quasiconformal Extendibility of Analytic Functions”, in Handbook of Complex Analysis. Vol. 1: Geometric Function Theory. Ed. by R. Káhnau (Martin-Luther-Universität, Halle, Germany, 2002), pp. 169–206.